National Climatic Data Center

DATA DOCUMENTATION

FOR

DATA SET 9641J (DSI-9641J)

MONTHLY NORMALS FOR THE ATYPICAL CLIMATE ELEMENTS
(WIND, PRESSURE, HUMIDITY, SNOW,
CLOUD COVER, SUNSHINE, DAYS WITH WEATHER)
U.S. STATIONS 1961-1990

December 20, 2002

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1. Abstract: This data set contains 1961-1990 climate normals for 290 National Weather Service and Federal Aviation Administration First Order and Second Order airport weather stations from all 50 States plus U.S. Territories and Possessions. These normals were prepared as the data set from which the U.S. station contribution, to the World Meteorological Organization 1961-1990 global standard normals project, would be selected. The global standard normals are prepared worldwide once every 30 years.

The major parameters that make up this data set consist of those climatic elements for which normals are not routinely (i.e., every decade) computed, and include: daily temperatures, precipitation, snowfall, and snow depth; hourly dry bulb temperature, wet bulb temperature, dew point temperature, relative humidity, sea level pressure, wind speed, and wind direction; cloud cover, sunshine duration, number of days with various weather elements (occurrence/nonoccurrence), and number of days with weather parameters beyond various threshold values. The statistics include: mean, median, quartiles, extremes, frequency distribution, standard deviation of monthly values, standard deviation of hourly values, and number of years with non-missing data.

The source data were obtained from the Summary of Day First Order (DSI-3210), Surface Airways Hourly (DSI-3280), and NCDC/CDIAC ORNL/CDIAC-43 data sets. The quality assurance process consisted of both manual and automated steps to detect and exclude questionable outliers. With the exception of wind speed, the sequential data were not adjusted for inhomogeneities. World Meteorological Organization guidance was followed in the computation of the normals.

This documentation describes the format and content of the data file and limited metadata as archived in ASCII fixed length record format. The archive contains two files: the first file is the data file and the second file is the metadata file. The record format for these two files is described on the following pages.

COMPUTATION OF THE NORMALS STATISTICS:

Sequential year-month values were generated for each year and month from January 1961 through December 1990. The normals computation process varied, depending on the element being processed and the statistics being computed (see details in the following element-specific subsections). With the exception of wind speed, the sequential data were not adjusted for inhomogeneities. World Meteorological Organization guidance was followed in the computation of the normals.

Unless otherwise stated, the monthly normal mean values were computed by summing the corresponding monthly values from all years in the), where pos=the number of days possible in the month and obs = the number of days in the month with non-missing data. These features (-8.8 and pro-rating), and possible rounding errors, may result in the following apparent inconsistencies: (1) the sum of the monthly values may not exactly equal the annual value, and (2) the cross element sums (e.g., number of days with precipitation = zero, plus number of days with precipitation = trace, plus number of days with precipitation >= 0.01 inches) may not exactly equal the maximum possible monthly (28.0, 30.0, or 31.0) or annual (365.0) value. In all cases, the apparent inconsistencies are minor.

COMPUTATION OF THE NORMALS STATISTICS---PROCEDURE FOLLOWED FOR MAXIMUM TEMPERATURE, MINIMUM TEMPERATURE, MEAN TEMPERATURE, PRECIPITATION, SNOWFALL, AND SNOW DEPTH:

For any given year and month, the monthly value was not computed from the daily values (the month was considered missing) if (1) five or more consecutive daily values were missing or (2) eleven or more daily values in total in the month were missing.

The normal values are provisional normals if (I) the input data values for any given month were missing for three or more consecutive years, or (ii) for any given month more than five years in total had missing input data. The normal values are considered standard normals only if all twelve calendar months passed the above criteria.

The annual normal values were computed by summing (for precipitation, snowfall, and 'number of days with') or averaging (for temperature) the monthly normal values.

For the monthly and annual total precipitation amount element, a value of -8.8 indicates a computed normal value greater than 0.0 but less than 0.005.

For precipitation, a value of -1.11 indicates an observed value of trace. For snowfall and snow depth, a value of -1.1 indicates an observed value of trace.

The mean monthly extreme daily maximum temperature (element code 14) was computed as follows: the value for each month of each year was the month's warmest daily maximum temperature. For each calendar month, these values from each year were summed over the period, with the sum being divided by the number of years of data. A similar procedure was followed for the mean monthly extreme daily minimum temperature (element code 24).

COMPUTATION OF THE NORMALS STATISTICS---PROCEDURE FOLLOWED FOR SUNSHINE DURATION:

The normal values are provisional normals if (1) the values for any given calendar month were missing for three or more consecutive years, or (2) for any given month a total of six or more years were missing, or (3) for the annual value, a total of six or more individual yearly values were missing. The normal values are considered standard normals only if all three of the above criteria were passed.

The annual normal values were computed by summing the monthly normal values.

COMPUTATION OF THE NORMALS STATISTICS---PROCEDURE FOLLOWED FOR CLOUD COVER:

For any given year and month, the monthly value was not computed from the daily values (the month was considered missing) if (1) five or more consecutive daily values were missing or (2) eleven or more daily values in total in the month were missing.

The normal values are provisional normals if (1) the values for any given calendar month were missing for three or more consecutive years, or (2) for any given month a total of six or more years were missing, or (3) for the annual value, a total of six or more individual yearly values were missing. The normal values are considered standard normals only if all three of the above criteria were passed.

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The annual normal values were computed by averaging the monthly normal values.

COMPUTATION OF THE NORMALS STATISTICS---PROCEDURE FOLLOWED FOR DRY BULB TEMPERATURE, WET BULB TEMPERATURE, DEW POINT TEMPERATURE, RELATIVE HUMIDITY, AND ATMOSPHERIC PRESSURE REDUCED TO MEAN SEA LEVEL:

For any given year and month, the monthly value was considered missing if a total of eleven or more days in the month were missing.

The normal values are provisional normals if (1) the values for any given calendar month were missing for three or more consecutive years, or (2) for any given month a total of six or more years were missing, or (3) for the annual value, a total of six or more individual yearly values were missing. The normal values are considered standard normals only if all three of the above criteria were passed.

For each 3-hourly observation time, for each year-month, the sum of the data values, and the sum of the squares of the data values, were computed and the number of data values were tallied. Statistics were computed for both the 3-hourly observation times separately and combined, as follows:

(1) Three-Hourly Normals: For each calendar month, for each 3-hourly observation time, the data sums, sum squares, and counts were separately summed across all available years in the normals period (i.e., the sums were summed, the sum squares were summed, and the counts were summed). Twelve monthly normal mean values were computed by dividing the aggregate period sum by the corresponding aggregate period count. Twelve monthly standard deviation values were computed from the corresponding aggregate period sum square, sum, and count. For the 3-hourly observation time's annual value, the data sums, sum squares, and counts for all twelve months were separately summed into annual values for each year only if all twelve months in the year were non-missing. These annual aggregates were then summed across the period and the annual mean and standard deviation were computed as they were for the months.

(2) All-Hours Normals: For each year, for each month, if all eight 3-hourly observation times had data, then their sums, sum squares, and counts were summed into all-hours sum, sum square, and count totals. These all-hours totals were summed across all available years in the normals period and monthly normal mean and standard deviation values were computed as in the previous paragraph. The all-hours annual normal mean and standard deviation values were also computed as above.

Additionally, for wet bulb temperature, dew point temperature, relative humidity, and atmospheric pressure reduced to mean sea level:

(3) For each year, for each month, if all eight 3-hourly observation times had data, then a monthly mean value was computed for that month/year by dividing the month's all-hours sum by its all-hours count. For each year, if all twelve months had non-missing all-hours data, then an annual mean was computed by dividing the aggregated all-hours sum from all twelve months by the corresponding aggregated all-hours count from all twelve months. Six statistics (standard deviation, first quartile, median, third quartile, minimum with most recent year of occurrence, and

maximum with most recent year of occurrence) were computed from these monthly and annual values across the normals period.

COMPUTATION OF THE NORMALS STATISTICS---PROCEDURE FOLLOWED FOR DAYS WITH WEATHER OCCURRENCES:

For any given year and month, the monthly value (count) was considered missing if a total of eleven or more days in the month were missing.

The normal values are provisional normals if (1) the input data values for any given month were missing for three or more consecutive years, or (2) for any given month more than five years in total had missing input data. The normal values are considered standard normals only if all twelve calendar months passed the above criteria.

The annual normal values were computed by summing the monthly normal values.

The standard deviation was computed from the sequential monthly values.

If a month had less than 16 years of data, then the mean, standard deviation, median, first quartile, and third quartile were not computed.

COMPUTATION OF THE NORMALS STATISTICS---PROCEDURE FOLLOWED FOR WIND:

The sequential monthly mean wind speed values were adjusted for anemometer height to correspond to a reference height of 10 meters, using the following equation (see pages 13-14 of WMO Publication No. 589 by B. Sevruk: "Methods of Correction for Systematic Error in Point Precipitation Measurement for Operational Use", Operational Hydrology Report No. 21 [World Meteorological Organization: Geneva, Switzerland, 1982]):

WSADJ = M * A * WSMEAN * ((LN(HREF/Z0))/(LN(H/Z0)))

where:

WSADJ = adjusted mean monthly wind speed
WSMEAN = observed mean monthly wind speed
HREF = reference height = 10 meters
H = anemometer height for the year-month
Z0 = roughness parameter (0.005 if the month is normally snow covered, or 0.03 if the monthly is normally not snow covered)
A = precipitation event amplification factor (assumed to be 1.0 in these computations)
M = factor for obstructions to vision (1.0 in these computations, which assumes no obstructions to vision).

For any given year and month, the monthly value was considered missing if a total of eleven or more days in the month were missing.

The normal values are provisional normals if (1) the input data values for any given month were missing for three or more consecutive years, or (2) for any given month more than five years in total had missing input data. The normal values are considered standard normals only if all twelve calendar months passed the above criteria.

For each 3-hourly observation time, for each wind direction on a 16-point compass plus calm and variable direction, for each year-month, the sum of the

data values (wind speeds) was computed and the number of data values (days with non-missing wind data) was tallied. Statistics were computed for both the 3-hourly observation times separately and combined, as follows:

(1) The mean wind speed, prevailing direction, and number of years with non-missing data were computed for the 3-hourly observation times as follows. For each year, the monthly wind speed sum and frequency count for all wind directions were summed. The mean wind speed for the month was computed by dividing this all-direction wind speed sum by the all-direction frequency count. The mean monthly wind speed for the month was then adjusted for anemometer height and surface terrain roughness to a reference height of ten meters (32.81 feet). The monthly normal mean values were computed by summing the corresponding monthly values from all years in the normals period, then dividing by the number of years of data. An annual mean wind speed normal was not computed for the 3-hourly observation times.

For each of the 12 calendar months, for each wind direction, the frequency counts from all years were summed. The direction having the greatest count was identified as the prevailing direction. In the unlikely event of two or more directions having the greatest (equal) count, the counts from the two adjoining directions were added to the respective tallies. If this did not break the tie, then the procedure was repeated to a maximum depth of three adjoining directions on either side. The annual prevailing wind direction was determined as outlined above (i.e., as outlined for the months) after combining the aggregate frequency counts from all 12 calendar months.

(2) The mean wind speed, prevailing direction, frequency distribution of wind direction, and number of years with non-missing data were computed for a combined tally of the data from all eight 3-hourly observations, as follows. For each year, the monthly wind speed sum and frequency count for all wind directions from all eight 3-hourly observation times were summed. A few stations were closed at night during some part of the period. If any of the 3-hourly observation times was missing for the month, then the entire month was considered missing in order to avoid a daytime bias. The monthly mean wind speed values were then computed as outlined above. The annual mean wind speed was computed by averaging the monthly mean values.

For each of the twelve calendar months, for each wind direction, the frequency counts from all years from all eight 3-hourly observation times were summed. If any of the 3-hourly observation times was missing for the month, then the entire month was considered missing in order to avoid a daytime bias and its frequency count was not considered. The monthly and annual prevailing directions were then determined as outlined above. The monthly and annual frequency distribution of wind direction was computed by dividing the respective monthly and annual all-hour all-year aggregate frequency counts for each direction by the sum of the all-hour all-year frequency counts from all directions totaled.

In the determination of prevailing direction, only the 16 compass directions were considered. For the frequency distribution of wind direction, the frequency occurrence of each of the 16 compass directions as well as calm and variable were computed.

2. Element Names and Definitions:

DATA RECORD FORMAT

RECORD FIELD	RECORD POSITION	FIELD WIDTH	TYPE	CONTENTS
01	001-005	5	alphanumeric	station I.D. (WBAN number)
02	006-009	4	numeric	first year of input data
03	010-013	4	numeric	last year of input data
04	014-014	1	numeric	normals code (standard/provisional indicator) (see Table 01)
05	015-016	2	alphanumeric	statistic code (see Table 02)
06	017-018	2	numeric	element code (see Table 03)
07	019-020	2	alphanumeric	date indicator code (see Table 04)
08	021-024	4	alphanumeric	threshold/wind direction/weather type indicator code (see Table 05)
09	025-026	2	numeric	time frame indicator code (see Table 06)
10	027-033	7	numeric	value for January (real with explicit decimal, or integer)
11	034-040	7	numeric	value for February (real with explicit decimal, or integer)
12	041-047	7	numeric	value for March (real with explicit decimal, or integer)
13	048-054	7	numeric	value for April (real with explicit decimal, or integer)
14	055-061	7	numeric	value for May (real with explicit decimal, or integer)
15	062-068	7	numeric	value for June (real with explicit decimal, or integer)
16	069-075	7	numeric	value for July (real with explicit decimal, or integer)
17	076-082	7	numeric	value for August (real with explicit decimal, or integer)
18	083-089	7	numeric	value for September (real with explicit decimal, or integer)
19	090-096	7	numeric	value for October (real with explicit decimal, or integer)
20	097-103	7	numeric	value for November (real with explicit decimal, or integer)
21	104-110	7	numeric	value for December (real with explicit decimal, or integer)
22	111-118	8	numeric	annual value, where applicable (real with explicit decimal, or integer)

TABLE 01. NORMALS CODE (STANDARD/PROVISIONAL INDICATOR).

CODE	VALUE
3	standard normal based on data that were not examined for homogeneity
5	provisional normal due to an insufficient period of record (for any of the 12 months: more than 5 years are missing, or 3 or more consecutive year-month values are missing)

TABLE 02. STATISTIC CODE.

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CODE	VALUE
AV	average
FR	frequency distribution (0.000-1.000)
MD	median
MN	extreme minimum
MX	extreme maximum
NY	number of years with non-missing data
PR	prevailing
Q1	first quartile
Q3	third quartile
SH	standard deviation of hourly values
SM	standard deviation of monthly values

TABLE 03. ELEMENT CODE.

CODE	VALUE
10	maximum temperature
11	daily maximum temperature (degrees Fahrenheit)
12	number of days with maximum temperature greater than or equal to a threshold (temperature threshold specified in Table 05)
13	number of days with maximum temperature less than or equal to a threshold (temperature threshold specified in Table 05)
14	monthly extreme daily maximum temperature (degrees Fahrenheit)
20	minimum temperature
21	daily minimum temperature (degrees Fahrenheit)
22	number of days with minimum temperature less than or equal to a threshold (temperature threshold specified in Table 05)
23	number of days with minimum temperature greater than or equal to a threshold (temperature threshold specified in Table 05)
24	monthly extreme daily minimum temperature (degrees Fahrenheit)
30	average temperature
31	difference in day-to-day mean temperature (degrees Fahrenheit)
40	monthly precipitation
41	daily precipitation (inches)
42	number of days with precipitation equal to a threshold (precipitation threshold specified in Table 05)
43	number of days with precipitation greater than or equal to a threshold (precipitation threshold specified in Table 05)
44	number of days with precipitation greater than a trace but less than 0.10 inches
45	daily precipitation amount for those days having precipitation (inches)
50	snowfall
51	monthly total snowfall (inches)
52	daily snowfall (inches)
53	number of days with snowfall equal to a threshold (snowfall threshold specified in Table 05)
54	number of days with snowfall greater than or equal to a threshold (snowfall threshold specified in Table 05)
55	median daily snowfall amount for all days (with or without snowfall) (inches)
56	median daily snowfall amount for those days having snowfall (inches)
60	depth of snow on the ground (snow depth)
61	daily snow depth amount (inches)

62	number of days with snow on the ground of depth equal to a threshold (snow depth threshold specified in Table 05)
63	number of days with snow on the ground of depth greater than or equal to a threshold (snow depth threshold specified in Table 05)
64	mean daily snow depth for those days having snow on the ground (inches)
65	median daily snow depth for those days having snow on the ground (inches)
71	hourly dry bulb temperature (degrees Fahrenheit)
72	monthly wet bulb temperature (degrees Fahrenheit)
73	hourly wet bulb temperature (degrees Fahrenheit)
74	monthly dew point temperature (degrees Fahrenheit)
75	hourly dew point temperature (degrees Fahrenheit)
80	monthly relative humidity (percent)
81	hourly relative humidity (percent)
82	monthly atmospheric pressure at sea level (millibars [hectoPascals])
83	hourly atmospheric pressure at sea level (millibars [hectoPascals])
84	number of days with weather (weather code specified in Table 05)
85	wind
86	wind speed (knots)
87	wind direction (wind direction codes defined in Table 07)
90	number of hours of sunshine
91	percent of maximum possible hours of sunshine (0.-100.)
92	maximum possible number of hours of sunshine
95	cloud cover
96	cloud cover (value is tenths of sky covered, 0.00-10.00)
97	cloud cover (value is oktas of sky covered, 0.0-8.0)

TABLE 04. DATE INDICATOR CODE.

CODE	VALUE
	blanks indicate the value is a data value
DA	value is a date (day of the month)
YR	value is a year

TABLE 05. THRESHOLD/WIND DIRECTION/WEATHER TYPE INDICATOR CODE.

CODE	VALUE
	all blanks indicate this field is not applicable
F###	### is a temperature threshold value in whole degrees Fahrenheit
H###	### is a precipitation threshold value in inches and hundredths
M###	### is a precipitation threshold value in whole millimeters
R001	a trace value for precipitation (a trace here is a value greater than 0.0 inches and less than 0.005 inches)
R010	a trace value for snowfall (a trace here is a value greater than 0.0 inches and less than 0.05 inches)
R100	a trace value for snow depth (a trace here is a value greater than 0.0 inches and less than 0.5 inches)
T###	### is a snowfall or snow depth threshold value in inches and tenths
Wddd	ddd is a wind direction code defined in Table 07
X###	### is a weather type code defined in Table 08

TABLE 06. TIME FRAME INDICATOR CODE.

CODE	VALUE
##	a value for ## of 00-23 indicates the hour (LST) of the day for the observation, based on a 24-hour clock
25	a monthly value that is based on all eight 3-hourly observations
26	a value based on daily data
30	a value based on monthly data

TABLE 07. WIND DIRECTION CODE.

CODE	VALUE
W001	N
W002	NNE
W003	NE
W004	ENE
W005	E
W006	ESE
W007	SE
W008	SSE
W009	S
W010	SSW
W011	SW
W012	WSW
W013	W
W014	WNW
W015	NW
W016	NNW
W017	variable direction
W018	calm (no direction)

TABLE 08. WEATHER TYPE CODES.

CODE	VALUE
X001	thunderstorms
X002	rain/drizzle
X003	freezing rain/freezing drizzle
X004	snow/hail
X005	hail/sleet
X006	precipitation
X007	fog/mist
X008	smoke/haze
X009	blowing snow
X010	dust/sand
X011	obstructions to vision

METADATA (STATION NAME AND LIMITED INVENTORY) RECORD FORMAT

RECORD FIELD	RECORD POSITION	FIELD WIDTH	TYPE	CONTENTS
01	001-005	5	alphanumeric	station I.D. (WBAN number)
02	006-006	1	alphanumeric	not used
03	007-021	15	alphanumeric	inventory indicator codes - = element not present a letter code = statistics are present for the indicated element
	007	1	alphanumeric	A = maximum temperature (based on daily data)
	008	1	alphanumeric	I = minimum temperature (based on daily data)
	009	1	alphanumeric	M = mean temperature (based on daily maximum and minimum temperature data)
	010	1	alphanumeric	P = precipitation (based on daily data)
	011	1	alphanumeric	F = snowfall (based on daily data)
	012	1	alphanumeric	D = snow depth (based on daily data)
	013	1	alphanumeric	X = days with weather occurrences (based on hourly airways observations)
	014	1	alphanumeric	W = wind (based on hourly airways observations)
	015	1	alphanumeric	Y = dry bulb temperature (based on hourly airways observations)
	016	1	alphanumeric	T = wet bulb temperature (based on hourly airways observations)
	017	1	alphanumeric	E = dew point temperature (based on hourly airways observations)
	018	1	alphanumeric	R = relative humidity (based on hourly airways observations)
	019	1	alphanumeric	S = sea level atmospheric pressure (based on hourly airways observations)
	020	1	alphanumeric	U = duration of sunshine (based on sunshine recorder data)
	021	1	alphanumeric	C = cloud cover (based on hourly airways observations)
04	022-022	1	alphanumeri	not used
05	023-025	3	numeric	number of records in normals file for this station
06	026-026	1	alphanumeric	not used
07	027-032	6	alphanumeric	corresponding Cooperative (COOP) Network station number (blanks indicate no COOP number assigned to this station)
08	033-033	1	alphanumeric	not used
09	034-038	5	alphanumeric	corresponding World Meteorological Organization (WMO) international index number (blanks indicate no WMO number assigned to this station)
10	039-039	1	alphanumeric	not used
11	040-069	30	alphanumeric	station name
12	070-070	1	alphanumeric	not used
13	071-072	2	alphanumeric	state abbreviation code (see Table 09)
14	073-073	1	alphanumeric	not used
15	074-079	6	numeric	latitude (to hundredths of degrees, where positive values designate Northern

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				Hemisphere, negative values designate Southern Hemisphere)
16	080-080	1	alphanumeric	not used
17	081-087	7	numeric	longitude (to hundredths of degrees, where positive values designate longitudes east of the prime meridian, negative values designate longitudes west of the prime meridian)
18	088-088	1	alphanumeric	not used
19	089-096	8	numeric	elevation (meters and tenths)
20	097-118	22	alphanumeric	not used

TABLE 09. STATE ABBREVIATION CODES (includes states, territories, and regions)

CODE	VALUE	CODE	VALUE	CODE	VALUE
AK	Alaska	MA	Massachusetts	OR	Oregon
AL	Alabama	MD	Maryland	PA	Pennsylvania
AR	Arkansas	ME	Maine	PI	Pacific Islands
AZ	Arizona	MI	Michigan	PR	Puerto Rico
CA	California	MN	Minnesota	RI	Rhode Island
CO	Colorado	MO	Missouri	SC	South Carolina
CT	Connecticut	MS	Mississippi	SD	South Dakota
DE	Delaware	MT	Montana	TN	Tennessee
FL	Florida	NC	North Carolina	TX	Texas
GA	Georgia	ND	North Dakota	UT	Utah
HI	Hawaii	NE	Nebraska	VA	Virginia
IA	Iowa	NH	New Hampshire	VT	Vermont
ID	Idaho	NJ	New Jersey	WA	Washington
IL	Illinois	NM	New Mexico	WI	Wisconsin
IN	Indiana	NV	Nevada	WV	West Virginia
KS	Kansas	NY	New York	WY	Wyoming
KY	Kentucky	OH	Ohio	XX	Antarctica
LA	Louisiana	OK	Oklahoma		

SOURCE OF THE INPUT DATA:

The source data for this data set originated from the Summary of Day First Order (DSI-3210), Surface Airways Hourly (DSI-3280), and NCDC/CDIAC ORNL/CDIAC-43 data sets. The data from 1961-1990 were extracted and processed separately by element category. Element categories extracted from DSI-3210 include:

maximum temperature,
minimum temperature,
precipitation,
snowfall,
snow depth, and
days with weather occurrences.

The element categories extracted from DSI-3280 include:

wind,
dry bulb temperature,
wet bulb temperature,

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dew point temperature,
relative humidity, and
atmospheric pressure reduced to mean sea level.

For sunshine duration and cloud cover, the source for the 1961-87 data was the NCDC/CDIAC data set ORNL/CDIAC-43: "Historical Sunshine and Cloud Data in the United States", Environmental Sciences Division Publication No. 3689. From this data set were obtained sequential year-month monthly and annual totals of observed sunshine duration and sunrise-sunset cloud cover from 1961-87 and total monthly and annual maximum possible sunshine duration. The source for the 1988-90 data was NCDC data set DSI-3210.

The quality assurance process consisted of both manual and automated steps and was applied to the data from both sources, TD-3210 and TD-3280. The data were displayed by means of an array which showed the frequency of occurrences along the entire range of observed values. This array was manually examined, with outliers being identified and flagged. If an outlier was determined to be questionable, then it was deleted from the analysis. A general knowledge of potential extremes as well as the individual station's climatology provided guidance in this process. A Hi-Lo file (a list of threshold values at both the upper and lower extremes revealed by the visual array process) was used in the automated step to filter the hourly or daily data, with values beyond the Hi-Lo thresholds being deleted.

The quality assurance process for sunshine duration consisted of the following steps. In the NCDC/CDIAC data set ORNL/CDIAC-43, missing monthly sunshine duration values were estimated from the available corresponding sunrise-sunset mean cloud amount data using seasonal and annual resistant regression equations. When this data set was originally created by NCDC and CDIAC, QC of the data included erroneous value checks, temporal consistency checks, sunshine-cloud cover consistency checks, and examination of outliers. QC of the 1988-90 data from TD-3210 included checking the daily observed sunshine duration for erroneous values (values less than zero or greater than 1440 minutes). The total daily minutes of sunshine duration were converted to monthly totals in hours. If a month had any missing days, the month was treated as missing.

The quality assurance process for cloud cover consisted of the following steps. In the NCDC/CDIAC data set ORNL/CDIAC-43, missing monthly cloud cover values were estimated from the available corresponding sunshine duration data using seasonal and annual resistant regression equations. When this data set was originally created by NCDC and CDIAC, QC of the data included erroneous value checks, temporal consistency checks, cloud cover-sunshine consistency checks, and examination of outliers. QC of the 1988-90 data from DSI-3210 included checking the daily mean sunrise-sunset cloud cover for erroneous values (values less than zero or greater than 1.0). The daily mean cloud cover values were averaged to compute a monthly mean cloud cover value.

Unless otherwise stated, the monthly normal mean values were computed by summing the corresponding monthly values from all years in the normals period, then dividing by the number of years of data.

A value of -99, -99.9, -99.99, -9.99, or -9.999 indicates a missing value (i.e., normal not computed due to insufficient data).

Unless otherwise stated, a value of -8.8 indicates a computed normal value greater than 0.0 but less than 0.05.

In the "number of days with" computations, if a month had a few missing days but still had sufficient days to be included in the analysis, then the number of days tallies were pro-rated by a factor consisting of (pos/obs

For any given year and month, the monthly value was not computed from the daily values (the month was considered missing) if (1) five or more consecutive daily values were missing or (2) eleven or more daily values in total in the month were missing.

3. Start Date: 19610101

4. Stop Date: 19901231

5. Coverage: Contiguous US, Alaska, Hawaii and territories

a. Southernmost Latitude: 17N
b. Northernmost Latitude: 72N
c. Westernmost Longitude: 64W
d. Easternmost Longitude: 172E a

6. How to Order Data:

Ask NCDC's Climate Services about the cost of obtaining this data set.
Phone: 828-271-4800
FAX: 828-271-4876
E-mail: **NCDC.Orders@noaa.gov**

7. Archiving Data Center:

National Climatic Data Center
Federal Building
151 Patton Avenue
Asheville, NC 28801-5001
Phone: (828) 271-4800.

8. Technical Contact:

National Climatic Data Center
Federal Building
151 Patton Avenue
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Phone: (828) 271-4800.

9. Known Uncorrected Problems: None.

10. Quality Statement: The quality assurance process consisted of both manual and automated steps and was applied to the data from both sources, DSI-3210 and DSI-3280. The data were displayed by means of an array that showed the frequency of occurrences along the entire range of observed values. This array was manually examined, with outliers being identified and flagged. If an outlier was determined to be questionable, then it was deleted from the analysis. A general knowledge of potential extremes as well as the individual station's climatology provided guidance in this process. A Hi-Lo file (a list of threshold values at both the upper and lower extremes revealed by the

visual array process) was used in the automated step to filter the hourly or daily data, with values beyond the Hi-Lo thresholds being deleted.

The quality assurance process for sunshine duration consisted of the following steps. In the NCDC/CDIAC data set ORNL/CDIAC-43, missing monthly sunshine duration values were estimated from the available corresponding sunrise-sunset mean cloud amount data using seasonal and annual resistant regression equations. When this data set was originally created by NCDC and CDIAC, QC of the data included erroneous value checks, temporal consistency checks, sunshine-cloud cover consistency checks, and examination of outliers. QC of the 1988-90 data from TD-3210 included checking the daily observed sunshine duration for erroneous values (values less than zero or greater than 1440 minutes). The total daily minutes of sunshine duration were converted to monthly totals in hours. If a month had any missing days, the month was treated as missing.

The quality assurance process for cloud cover consisted of the following steps. In the NCDC/CDIAC data set ORNL/CDIAC-43, missing monthly cloud cover values were estimated from the available corresponding sunshine duration data using seasonal and annual resistant regression equations. When this data set was originally created by NCDC and CDIAC, QC of the data included erroneous value checks, temporal consistency checks, cloud cover-sunshine consistency checks, and examination of outliers. QC of the 1988-90 data from DSI-3210 included checking the daily mean sunrise-sunset cloud cover for erroneous values (values less than zero or greater than 1.0). The daily mean cloud cover values were averaged to compute a monthly mean cloud cover value.

11. Essential Companion Datasets: None.

12. References:

B. Sevruk B.: "Methods of Correction for Systematic Error in Point Precipitation Measurement for Operational Use", WMO Publication No. 589, Operational Hydrology Report No. 21, World Meteorological Organization: Geneva, Switzerland, 1982